Part 1—Definitions and Abbreviations

This change incorporates Amendment 1–44, Extended Overwater Operations With a Single Long-Range Communication System (LRCS) and a Single Long-Range Navigation System (LRNS), adopted February 20 and effective February 26, 1996. Section 1.1 is affected by this amendment.

Bold brackets enclose the most recently changed or added material.

Page Control Chart

Remove Pages	Dated	Insert Pages	Dated
		P–273 through P–279	Ch. 4
1 through 10	Ch. 3	1 through 11	Ch. 4

Suggest filing this transmittal at the beginning of the FAR. It will provide a method for determining that all changes have been received as listed in the current edition of AC 00–44, Status of Federal Aviation Regulations, and a check for determining if the FAR contains the proper pages.

SUMMARY: This action revises the Federal Aviation Regulations for certain overwater operations for air carriers, commercial operators, and general aviation operators of large and of turbine-powered multiengine airplanes. It defines and clarifies requirements for using long-range navigation systems (LRNS) and long-range communication systems (LRCS) and sets forth criteria for navigation and communication equipment for certain overwater operations. Under this rule, air carriers and commercial operators are authorized to use a single LRCS and a single LRNS for extended overwater routes detailed in their operations specifications. Affected general aviation operators, who already are authorized to use a single LRCS when they have two very high frequency (VHF) communication systems, are authorized to use a single LRNS in overwater operations in the Gulf of Mexico, the Caribbean Sea, and part of the western Atlantic Ocean. This rule gives the FAA greater flexibility in responding to advances in aviation technology and changes in the operational environment and allows operators to conduct extended overwater operations without carrying unnecessary communication and navigation equipment.

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SUPPLEMENTARY INFORMATION:

Background

Air traffic in the Gulf of Mexico, the Caribbean Sea, and part of the western Atlantic Ocean (subsequently referred to in this document as the geographic area) has increased substantially during the last 20 years. With this increase has come corresponding technological advances inherent with more modern aircraft and improved navigation and communications systems.

Advances in aircraft technology have increased the overall speed and functional reliability of modern airplanes. These high-speed airplanes can cover routes in the geographic area much more quickly than their predecessors. Because of their higher speeds, they also can cover greater distances during the time between hourly fixes. Thus, the number of routes in the geographic area where time between reliable fixes was 1 hour or more has been reduced for these airplanes. Similarly, the airplane's exposure to the loss of its LRNS before the next reliable fix can be obtained is reduced. Since such aircraft also routinely operate at higher altitudes en route, they can conduct very high frequency (VHF) communications at greater ranges from their corresponding ground facilities than their predecessors.

Advances in avionics have resulted in increasingly accurate and dependable navigation systems, using inputs from Loran C, Omega/very low frequency (VLF), inertial navigation, or reference systems (INS), and, most recently, the global positioning satellite navigation system (GPS). Each navigation system typically gives instantaneous readouts of position, ground speed, wind, and waypoint progress. Radio communication systems have enjoyed similar advances. Bulky vacuum tube units have given way to miniaturized units with transistors, precise frequency selection, and high reliability, which produce the same or greater transmitting power than older models. In addition, the proliferation of VHF communication facilities within the geographic area ensures that many routes now can be flown with a VHF communications gap of no more than 30 minutes.

The increased reliability of modern LRNS reduces navigation errors. Sophisticated flight management systems (FMS) integrate control and navigation systems of an airplane and combine several navigation inputs to provide greater position reliability. The multiple navigation inputs into an FMS increase the accuracy of the system, and its reliability when compared to earlier navigation systems which only received a single source input. If the LRNS fails on an airplane using such sophisticated equipment, navigation errors inherent in dead-reckoning procedures from the moment of the failure until the next reporting point or fix should be well within the navigational performance capability required for the route to be flown.

the affected airplane with some backup VHF communications with ATC. Moreover, regardless of the number of other aircraft in the area, if the flightcrew adheres to proper operational procedures, failure of the LRNS should not lead to an increased potential for conflict between aircraft before the airplane could come into range of suitable navigation aids (e.g. non-directional beacon, very high frequency omnirange (VOR), etc.).

Because of the increased speeds and higher altitudes at which airplanes now operate, improved equipment, improved reliability, and greater accuracy of LRNS systems, the FAA has concluded that, where exposure time for a critical equipment failure is 1 hour or less, the following is true:

- The probability of a failure is less than the probability of a failure with less modern equipment;
- With the accuracy of the present equipment, operators have better knowledge of their position if a failure does occur.

All of the factors discussed above have brought about the need to update the regulations to conform current technology to the types of operations that are currently being authorized. Namely, the FAA has found that operations in the geographic area can be conducted without the burden of additional navigation and communication systems carried in the aircraft. Therefore, on a case-by-case basis, and with certain conditions and limitations, the FAA has allowed a number of operators to conduct operations in the geographic area with a single LRCS and a single LRNS. To date, such operations have had no adverse effect on safety.

General Discussion of Current Requirements for Extended Overwater Operations

General Aviation Operations

With one exception, set forth in § 91.511(d), 14 Code of Federal Regulations part 91, subpart F, the FAA currently requires large and turbine-powered multiengine airplanes engaged in overwater operations to be equipped with two independent communication and two independent navigation systems. Communication equipment must be appropriate to the facilities to be used and able to transmit to and receive from at least one surface facility at any place on the route. Navigation equipment must be able to provide the pilot with the information necessary to navigate the airplane within the airspace assigned by ATC. Under the exception in § 91.511(d), if a route requires the use of both VHF and LRCS communication equipment, and the airplane has two VHF transmitters and two VHF receivers, then only one LRCS transmitter and one LRCS receiver is required for communications.

Air Carrier and Commercial Operations

Parts 121, 125, and 135 also require airplanes engaged in extended overwater operations to be equipped with two independent communication and two independent navigation systems. Like part 91, parts 125 and 135 require that the communication equipment be appropriate to the facilities to be used and capable of transmitting to and receiving from at least one ground facility at any place on the route. Although the regulatory language differs somewhat, part 121 contains essentially the same requirements for communication equipment. Specifically, part 121 requires two independent communication systems able to communicate, under normal operating conditions, with (1) at least one appropriate ground station from any point on the route and with (2) appropriate traffic control facilities from any point in the airspace within which the flights are intended. These communication systems also must be able to receive meteorological information from any point en route. Unlike part 91, however, parts 121, 125, and 135 do not allow the use of a single LRCS where the airplane is also equipped with two VHF radios or systems. Thus, if a route requires use of both VHF and LRCS, airplanes operating under parts 121, 125, and 135 must have two VHF radios and two LRCS.

Section 121.349(b) allows for the use of a single automatic direction finder (ADF) when two VOR navigation units are installed and VOR navigation aids are so located and the airplane is so fueled that, in the case of a failure of the ADF, the flight may proceed safely to a suitable airport by means of VOR aids. In all other cases, when use of ADF, VOR navigation equipment, or both, is needed

LRNS will be permitted for part 121, 125, and 135 operators.

Aside from the current authority set forth in §§ 91.511(d) and 121.349(b), this rule does not change the general requirements under parts 91, 121, 125, and 135 for two VHF communication systems and two each of any appropriate navigation systems required for the route to be flown except in the geographic area. The FAA has concluded that, by maintaining these requirements, air transportation safety is not compromised.

The FAA is amending part 91 and creating operation specification authority for operators under parts 121, 125, and 135 based on the factors mentioned above and on the operator's ability to maintain two-way communications with ATC and, where appropriate, the certificate holder's dispatch office. Without such factors, ATC's ability to control airplanes in the geographic area would be adversely impacted, increasing the potential for air traffic conflicts. The flightcrew must be able to notify ATC of an LRNS failure and must be able to tell ATC whether the flightcrew can reliably fix the airplane's position using other means.

Part 91

As a result of changes in technology, the operational environment described, and experience gained with exemptions allowing a single LRNS, the FAA has concluded that part 91 operators of large and of turbojet multiengine airplanes should be able to operate safely with a single LRCS and a single LRNS in the geographic area. In conducting operations in the geographic area, these general aviation operators should consider how long they may be without two-way VHF communications. For flight planning purposes, the FAA recommends that this gap should not exceed 30 minutes. The operator also should consider whether the position of the airplane can be reliably fixed at least once each hour if the LRNS fails.

Parts 121, 125, and 135

The FAA believes that the only appropriate method for authorizing single LRCS/single LRNS operations for part 121, 125, and 135 certificate holders is through FAA-approved authorizations, which will be set forth in the certificate holder's operations specifications. This method of approval is necessary because it will provide both the FAA and the certificate holder greater flexibility in dealing with varied equipment configurations, possible reclassification of airspace operating areas, changes in navigational requirements, and changes in air traffic separation standards.

The FAA has authorized these operations in the past and has determined that controlling a VHF communication gap through operations specifications will provide an equivalent level of safety. Loss of the single LRNS still requires each operator to reliably fix the airplane's position at least once each hour if the flight is continued and to navigate within the required degree of accuracy over any authorized route.

Definition of LRNS and LRCS

In the proposal, the FAA defined an LRNS as an electronic navigation unit that is approved for use under instrument flight rules (IFR) as a primary means of navigation and has at least one source of navigational input, such as INS, Omega/very low frequency, and Loran C. In this definition, the FAA did not limit the scope of acceptable LRNS to radio-based or ground-based systems. Such nonradio, nonground-based systems as INS are included within the scope of acceptable alternatives as long as the system chosen has been approved for use under IFR. If approved, GPS or similar navigation systems also would fall within this definition. Where ADF or VOR radio navigation is impractical or unusable, the FAA interprets the current regulations to require the airplane to be equipped with two LRNS for extended overwater operations. This final rule changes this dual LRNS requirement. For parts 121, 125, and 135, authorization for a single LRNS and a single LRCS will be approved in the certificate holder's operations specifications. Since affected part 91 operators do not use operations specifications, they would be authorized to use a single LRNS, but only in the geographic area.

Because part 91 operators are not required to have operations specifications, this rule limits general aviation single LRNS operations to the geographic area. The areas of operation covered in this rule for affected general aviation operators include the Gulf of Mexico, the Caribbean Sea, and the Atlantic Ocean west of a line which extends from 44°47′00″ N / 67°00′00″ W to 39°00′00″ N / 67°00′00″ W to 38°30′00″ N /60°00′00″ W south along the 60°00′00″ W longitude line to the point where the line intersects with the northern coast of South America. This geographic area does not include the North Atlantic Minimum Navigational Performance Specifications (NAT/MNPS) airspace, where operations are governed by § 91.705 and appendix C to part 91.

Limitations for air carrier and commercial operations will be set forth in the certificate holders' operations specifications. As in the case of general aviation operations, the area of operation for air carrier and commercial operators will not include NAT/MNPS airspace. At a minimum, these operators must always comply with International Civil Aviation Organization (ICAO) requirements for the area of operations.

Discussion of Comments

On October 5, 1993, the FAA published a notice proposing to allow extended overwater operations with single LRCS and single LRNS (58 FR 51938). The FAA received six comments on the proposal. The National Business Aircraft Association, Inc. (NBAA), the Aircraft Owners and Pilots Association (AOPA), and the Air Transport Association (ATA) expressed support with recommendations. Northwest Airlines expressed neither support nor opposition but did provide a recommendation. The Boeing Commercial Airplane Group acknowledged the proposal but had ''no comment'' and an aviation consulting firm was opposed to the proposal. These comments are discussed as follows:

NBAA

The NBAA indicated that it ''strongly supports'' the proposed changes to allow single LRNS and LRCS. It recommended, however, that proposed § 121.99 be incorporated into parts 91, 125, and 135 since these parts also require the latitude to access new technology communication links without being tied solely to HF.

FAA Response: This rule is intended to affect use of LRNS and LRCS for extended overwater operations. The FAA recognizes that additional updates to the rules are needed in view of advances in technology, such as GPS. Such changes will be addressed in future rulemaking initiatives.

AOPA

AOPA supported the proposal and recommended that the requirement for an LRCS be eliminated entirely for certain aircraft in flight conditions where no more than a 30-minute gap in two-way communications exists. AOPA supported its recommendation by stating that LRCS equipment is cumbersome and expensive. According to the commenter, LRCS equipment is often adversely affected by precipitation and other weather conditions. Further, in overwater areas, pilots relay transmissions to ATC through other aircraft and do not depend on their LRCS.

FAA Response: The FAA acknowledges that an LRCS has some disadvantages; however, these disadvantages are offset by the necessity for communications when an airplane is operating in extended overwater beyond the range of VHF ground-based communications. While airplanes operating in accordance with § 91.511 are not involved in the carriage of persons or cargo for compensation or hire, these airplanes nevertheless share airspace in the geographic area with air carriers which are engaged in transporting passengers and cargo. Therefore, the FAA considers it necessary for safety that all aircraft operating in the geographic area be able to communicate with ATC at all times.

Northwest Airlines

Northwest Airlines suggested that the proposed rule be amended to allow operations in NAT/MNPS airspace for flights to and from SLATIN along or west of A632. According to the commenter, the area of NAT/MNPS airspace traversed by A632 is within VHF coverage except for an area of non-coverage located on either side of the mid point of A632 between Bermuda and the mainland of the U.S. The commenter asserted that this non-coverage area can be traversed within 6 minutes. Northwest further indicated that extending the boundary of the area below 27°00′00″ N from longitude 60°00′00″ N to 58°00′00″ W, would include the island of Barbados and thereby preclude any confusion regarding coverage of the total Caribbean island chain. Lastly, Northwest indicated that the coordinates describing operations under part 91 do not have the same boundaries as defined by part 91, appendix C. According to the commenter, this presents confusion to ATC with respect to the different requirements for air carrier and general aviation operations.

FAA Response: The route from SLATIN along A632 to approximate 38°30′00″ N and 67°30′00″ W is NAT/MNPS airspace and, as such, is governed by ICAO agreements which require redundant navigation and communication systems. It is not within the scope (authority) of this rule to alter those agreements. This airspace represents an extremely small part of the total geographic area considered in this rule and can be crossed in 6 minutes by a turbine-powered air transport category airplane. Airlines may operate through this airspace with one LRNS and one LRCS provided they obtain a letter of agreement with ATC. These operations have been successful in the past and the FAA does not consider it to be in the public interest for the U.S. government to file a difference with ICAO.

The boundaries defined in the rule represent a general oceanic area, outside NAT/MNPS airspace, in which a single LRNS and single LRCS may be used when an airplane is unable to navigate by reference to standard ICAO navigational aids such as VOR or ADF. The location of the island of Barbados outside the western boundary of the geographic area does not exclude it from operations conducted under this regulation since VOR coverage extends well into the geographic area.

The commenter's concern regarding possible conflict between the requirements of part 91, appendix C and the boundaries of the geographic area of the rule is unfounded. Part 91, appendix C refers to operations within NAT/MNPS airspace whereas the regulation limits operation to airspace outside NAT/MNPS airspace.

Aviation Consulting Firm

George Rabe & Associates, the aviation consulting firm opposed to the proposal indicated that some of the more modern communication and navigation systems are an improvement; however, some are not. Nonetheless, according to the commenter, since smaller airlines cannot afford to purchase the more expensive communication and navigation systems, they do not have the luxury of operating with enhanced accuracy and reliability provided by the more sophisticated systems. This commenter stated that the economic arguments of the proposal are not justified given that GPS is expected to bring down costs and that some operators will still conduct operations requiring the use of dual LRNS and LRCS. Moreover, according to this commenter, increased air traffic and reduced separation standards should bring forth a requirement for improved navigation safety not a reduction in safety standards. Indicating that errors are not mechanical but human, this commenter recommended maintaining the requirement for dual LRNS and LRCS and also improving training requirements.

FAA Response: The FAA realizes that cost differences exist among LRNS and LRCS equipment and that there may be some differences in accuracy; however, all equipment used for operations under this rule must meet certain standards of approval established by the FAA. These standards serve to assure that an acceptable level of safety is maintained regardless of the cost and availability of the equipment.

Economic Summary

This final rule reduces costs to operators by eliminating the requirements for two LRCS and two LRNS in the Gulf of Mexico, part of the western Atlantic Ocean, and the Caribbean Sea (the geographic area). Savings will come from reduced avionics costs, reduced fuel consumption from less aircraft weight, and reduced risk of flight cancellations due to inoperative equipment.

The FAA estimates the fleet size operating in the geographic area will be approximately 158 airplanes in 1995. The FAA assumes that the size of the fleet serving the geographic area will grow by 5.5 percent annually over the 10-year period, 1995–2004. Although the fleet composition varies from jumbo jets to smaller twin-engine turboprop planes, commercial operators most often use Boeing 727's in the geographic area. In addition to the scheduled commercial fleet, general aviation and non-commercial operators operating in the geographic area will gain some relief from this rule as well. The FAA, however, does not have an accurate measure of the size of the fleet operating in the geographic area.

Each commercial operator will save approximately $17,000 per airplane in equipment costs and will reduce aircraft weight 20 pounds per airplane by eliminating one LRCS; each commercial operator will save about $36,000 per airplane in equipment costs and will reduce aircraft weight 20 pounds per airplane by eliminating one LRNS. For existing airplanes with equipment made redundant by this rule, the resulting avionics cost savings will total about $53,000 per converted airplane. The FAA also estimates that each additional pound on an airplane costs an operator an additional 15 gallons of fuel annually. Assuming a converted airplane removes two 20-pound pieces of equipment, the reduction in weight will save 600 gallons of fuel each year. Using a 1993 average jet fuel price of $.675 per gallon, the reduction in weight of 600 gallons of fuel per year will result in annual savings totaling over $400 per converted airplane.

Additional savings from the rule will also come from reduced flight cancellations as operators experience fewer equipment failures as a result of the reduced equipment requirements. Cost reduction resulting from the prevention of a cancellation depends on passenger time, passenger handling costs, lost revenue, and operating costs. The approximate cost of a Boeing 727 cancellation is estimated to equal just over $28,000. The FAA, however, does not have an accurate estimate for the number of flight cancellations attributable to non-functioning LRCS or LRNS for airplanes operating in the geographic area from which to estimate the total cost savings resulting from reduced cancellations.

The FAA assumes that 50 percent of the commercial fleet serving the geographic area will reduce the equipment in its airplanes to only one LRCS and one LRNS, and that this conversion will occur during the first 2 years after implementation of the rule. Thereafter, the FAA assumes that one-half the airplanes added to the commercial fleet will be placed in service with only one LRCS and one LRNS. The FAA further assumes that the savings resulting from reduced fuel expenditure applies to the equipment conversion of 50 percent of the fleet converting to a single LRCS and a single LRNS.

In each of the first 2 years after the rule becomes effective, the industry will reduce avionics costs by over $2 million. Over the decade 1995–2004, the total savings in 1993 dollars for reduced avionics requirements will exceed $6.7 million. The fuel savings resulting from airplane weight reduction will add another $389,000 in reduced costs, bringing the total cost savings in 1993 dollars for this final rule to more than $7.1 million. The net discounted savings for the decade 1995–2004, will total just over $5.7 million.

The FAA has determined that no safety problem exists with the reduction in requirements for dual LRCS and dual LRNS for certain overwater operations. In the past two decades, the FAA has granted limited exemption from the requirements for dual LRCS and LRNS to certain qualified operators operating in the geographic area. No airplane operating under exemption has had an accident which can be attributed to having only one LRCS or one LRNS. During that time, the accuracy and reliability of navigation equipment has continuously improved. Thus, the FAA believes that this rule presents no degradation in aviation safety in the geographic area.

FAA criteria define "a substantial number" as not less than eleven nor more than one-third of the small entities subject to the rule. Among air carriers, a small entity is defined as one which owns, but does not necessarily operate, nine or fewer aircraft. The criteria define "a significant impact" as follows: $102,000 for scheduled air carriers with 60 or more seats; $57,000 for scheduled air carriers with fewer than 60 seats.

This amendment is wholly cost relieving. By eliminating the need for two LRCS and LRNS in the geographic area, the estimated cost savings to an operator is $53,000. This savings is less than the threshold amount for small, scheduled operators.

Federalism Implications

The regulations adopted herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this rule would not have federalism implications requiring the preparation of a Federalism Assessment.

International Civil Aviation Organization and Joint Aviation Regulations

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with ICAO Standards and Recommended Practices (SARP) to the maximum extent practicable. For this amendment, the FAA has reviewed the SARP of Annex 6, Parts I and II, applicable to international commercial air transportation operations and international general aviation operations respectively. The FAA has determined that this rule would not present any differences.

Paperwork Reduction Act

This rule contains no information collection requests requiring approval of the Office of Management and Budget pursuant to the Paperwork Reduction Act (44 U.S.C. 3507 *et seq.*).

Conclusion

For the reasons discussed in the preamble, and based on the findings in the Regulatory Flexibility Determination and the International Trade Impact Statement, the FAA has determined that this regulation is not significant under Executive Order 12866. In addition, it is certified that this rule will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. This rule is not significant under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979).

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends 14 CFR parts 1, 91, 121, 125, and 135 effective February 26, 1996.

The authority citation for part 1 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

Part 1 Definitions and Abbreviations

Source: Docket No. 1150 (27 FR 4588, 5/15/62)

§ 1.1 General definitions.

As used in subchapters A through K of this chapter unless the context requires otherwise—

Administrator means the Federal Aviation Administrator or any person to whom he has delegated his authority in the matter concerned.

Aerodynamic coefficients means nondimensional coefficients for aerodynamic forces and moments.

Air carrier means a person who undertakes directly by lease, or other arrangement, to engage in air transportation.

Air commerce means interstate, overseas, or foreign air commerce or the transportation of mail by aircraft or any operation or navigation of aircraft within the limits of any Federal airway or any operation or navigation of aircraft when directly affects, or which may endanger safety in, interstate, overseas, or foreign air commerce.

Aircraft means a device that is used or intended to be used for flight in the air.

Aircraft engine means an engine that is used or intended to be used for propelling aircraft. It includes turbosuperchargers, appurtenances, and accessories necessary for its functioning, but does not include propellers.

Airframe means the fuselage, booms, nacelles, cowlings, fairings, airfoil surfaces (including rotors but excluding propellers and rotating airfoils of engines), and landing gear of an aircraft and their accessories and controls.

Airplane means an engine-driven fixed-wing aircraft heavier than air, that is supported in flight by the dynamic reaction of the air against its wings.

Airport means an area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any.

Airship means an engine-driven lighter-than-air aircraft that can be steered.

Air traffic means aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air traffic clearance means an authorization by air traffic control, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace.

Air traffic control means a service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

Air transportation means interstate, overseas, or foreign air transportation or the transportation of mail by aircraft.

Alert area means an area that is established to inform pilots of a specific area wherein a high volume of pilot training or an unusual type of aeronautical activity is conducted.

Alternate airport means an airport at which an aircraft may land if a landing at the intended airport becomes inadvisable.

Altitude engine means a reciprocating aircraft engine having a rated takeoff power that is producible from sea level to an established higher altitude.

Appliance means any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communications equipment, that is used or intended to be used in operating or controlling an aircraft in flight, is installed in or attached to the aircraft, and is not part of an airframe, engine, or propeller.

Approved, unless used with reference to another person, means approved by the Administrator.

Area navigation (RNAV) means a method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals or within the limits of self-contained system capability.

Area navigation low route means an area navigation route within the airspace extending upward from 1,200 feet above the surface of the earth to, but not including, 18,000 feet MSL.

Area navigation high route means an area navigation route within the airspace extending upward from, and including, 18,000 feet MSL to flight level 450.

Armed Forces means the Army, Navy, Air Force, Marine Corps, and Coast Guard, including their

Balloon means a lighter-than-air aircraft that is not engine driven.

Brake horsepower means the power delivered at the propeller shaft (main drive or main output) of an aircraft engine.

Calibrated airspeed means indicated airspeed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.

Canard means the forward wing of a canard configuration and may be a fixed, movable, or variable geometry surface, with or without control surfaces.

Canard configuration means a configuration in which the span of the forward wing is substantially less than that of the main wing.

Category—

(1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a broad classification of aircraft. Examples include: airplane; rotorcraft; glider; and lighter-than-air; and

(2) As used with respect to the certification of aircraft, means a grouping of aircraft based upon intended use of operating limitations. Examples include: transport, normal, utility, acrobatic, limited, restricted, and provisional.

Category A, with respect to transport category rotorcraft, means multiengine rotorcraft designed with engine and system isolation features specified in part 29 and utilizing scheduled takeoff and landing operations under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight in the event of engine failure.

Category B, with respect to transport category rotorcraft, means single-engine or multiengine rotorcraft which do not fully meet all Category A standards. Category B rotorcraft have no guaranteed stay-up ability in the event of engine failure and unscheduled landing is assumed.

Category II operations, with respect to the operation of aircraft, means a straight-in ILS approach to the runway of an airport under a Category II phenomena that is reported as *broken*, *overcast*, or *obscuration*, and not classified as *thin* or *partial*.

Civil aircraft means aircraft other than public aircraft.

Class—

(1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a classification of aircraft within a category having similar operating characteristics. Examples include: single engine; multiengine; land; water; gyroplane; helicopter; airship; and free balloon; and

(2) As used with respect to the certification of aircraft, means a broad grouping of aircraft having similar characteristics of propulsion, flight, or landing. Examples include: airplane; rotorcraft; glider; balloon; landplane; and seaplane.

Clearway means—

(1) For turbine engine powered airplanes certificated after August 29, 1959, an area beyond the runway, not less than 500 feet wide, centrally located about the extended centerline of the runway, and under the control of the airport authorities. The clearway is expressed in terms of a clearway plane, extending from the end of the runway with an upward slope not exceeding 1.25 percent, above which no object nor any terrain protrudes. However, threshold lights may protrude above the plane if their height above the runway is 26 inches or less and if they are located to each side of the runway.

(2) For turbine engine powered airplanes certificated after September 30, 1958, but before August 30, 1959, an area beyond the takeoff runway extending no less than 300 feet on either side of the extended centerline of the runway, at an elevation no higher than the elevation of the end of the runway, clear of all fixed obstacles, and under the control of the airport authorities.

Climbout speed, with respect to rotorcraft, means a referenced airspeed which results in a flight path clear of the height-velocity envelope during initial climbout.

for profit.

Controlled airspace means an airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification.

NOTE: Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D, and Class E airspace.

Controlled firing area means an area that is established to contain activities, which if not conducted in a controlled environment, would be hazardous to nonparticipating aircraft.

Crewmember means a person assigned to perform duty in an aircraft during flight time.

Critical altitude means the maximum altitude at which, in standard atmosphere, it is possible to maintain, at a specified rotational speed, a specified power or a specified manifold pressure. Unless otherwise stated, the critical altitude is the maximum altitude at which it is possible to maintain, at the maximum continuous rotational speed, one of the following—

(1) The maximum continuous power, in the case of engines for which this power rating is the same at sea level and at the rated altitude.

(2) The maximum continuous rated manifold pressure, in the case of engines the maximum continuous power of which, is governed by a constant manifold pressure.

Critical engine means the engine whose failure would most adversely affect the performance or handling qualities of an aircraft.

Decision height, with respect to the operation of aircraft, means the height at which a decision must be made, during an ILS or PAR instrument approach, to either continue the approach or to execute a missed approach.

Equivalent airspeed means the calibrated airspeed of an aircraft corrected for adiabatic compressible flow for the particular altitude. Equivalent airspeed is equal to calibrated airspeed in standard atmosphere at sea level.

Extended over-water operation means—

(1) With respect to aircraft other than helicopters, and operation over water at a horizontal

External-load attaching means means the structural components used to attach an external load to an aircraft, including external-load containers, the backup structure at the attachment points, and any quick-release device used to jettison the external load.

Fireproof—

(1) With respect to materials and parts used to confine fire in a designated fire zone, means the capacity to withstand at least as well as steel in dimensions appropriate for the purpose for which they are used, the heat produced when there is a severe fire of extended duration in that zone; and

(2) With respect to other materials and parts, means the capacity to withstand the heat associated with fire at least as well as steel in dimensions appropriate for the purpose for which they are used.

Fire resistant—

(1) With respect to sheet or structural members means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used; and

(2) With respect to fluid-carrying lines, fluid system parts, wiring, air ducts, fittings, and powerplant controls, means the capacity to perform the intended functions under the heat and other conditions likely to occur when there is a fire at the place concerned.

Flame resistant means not susceptible to combustion to the point of propagating a flame, beyond safe limits, after the ignition source is removed.

Flammable, with respect to a fluid or gas, means susceptible to igniting readily or to exploding.

Flap extended speed means the highest speed permissible with wing flaps in a prescribed extended position.

Flash resistant means not susceptible to burning violently when ignited.

Flight crewmember means a pilot, flight engineer, or flight navigator assigned to duty in an aircraft during flight time.

to the intended flight of an aircraft, that is filed orally or in writing with air traffic control.

Flight time means the time from the moment the aircraft first moves under its own power for the purpose of flight until the moment it comes to rest at the next point of landing. (*Block-to-block* time.)

Flight visibility means the average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.

Foreign air carrier means any person other than a citizen of the United States, who undertakes directly, by lease or other arrangement, to engage in air transportation.

Foreign air commerce means the carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in the United States and any place outside thereof; whether such commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation.

Foreign air transportation means the carriage by aircraft of persons or property as a common carrier for compensation or hire, or the carriage of mail by aircraft, in commerce between a place in the United States and any place outside of the United States, whether that commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation.

Forward wing means a forward lifting surface of a canard configuration or tandem-wing configuration airplane. The surface may be a fixed, movable, or variable geometry surface, with or without control surfaces.

Glider means a heavier-than-air aircraft, that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine.

Go-around power or thrust setting means the maximum allowable in-flight power or thrust setting identified in the performance data.

Gyroplane means a rotorcraft whose rotors are not engine-driven except for initial starting, but are made to rotate by action of the air when the rotorcraft is moving; and whose means of propulsion, consisting usually of conventional propellers, is independent of the rotor system.

Helicopter means a rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors.

Heliport means an area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters.

Idle thrust means the jet thrust obtained with the engine power control lever set at the stop for the least thrust position at which it can be placed.

IFR conditions means weather conditions below the minimum for flight under visual flight rules.

IFR over-the-top, with respect to the operation of aircraft, means the operation of an aircraft over-the-top on an IFR flight plan when cleared by air traffic control to maintain "VFR conditions" or "VFR conditions on top".

Indicated airspeed means the speed of an aircraft as shown on its pitot static airspeed indicator calibrated to reflect standard atmosphere adiabatic compressible flow at sea level uncorrected for airspeed system errors.

Instrument means a device using an internal mechanism to show visually or aurally the attitude, altitude, or operation of an aircraft or aircraft part. It includes electronic devices for automatically controlling an aircraft in flight.

Interstate air commerce means the carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in any State of the United States, or the District of Columbia, and a place in any other State of the United States, or the District of Columbia; or between places in the same State of the United States through the airspace over any place outside thereof; or between places in

of the District of Columbia;

(2) Between places in the same State through the airspace over any place outside that State; or

(3) Between places in the same possession of the United States;

whether that commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation.

Intrastate air transportation means the carriage of persons or property as a common carrier for compensation or hire, by turbojet-powered aircraft capable of carrying thirty or more persons, wholly within the same State of the United States.

Kite means a framework, covered with paper, cloth, metal, or other material, intended to be flown at the end of a rope or cable, and having as its only support the force of the wind moving past its surfaces.

Landing gear extended speed means the maximum speed at which an aircraft can be safely flown with the landing gear extended.

Landing gear operating speed means the maximum speed at which the landing gear can be safely extended or retracted.

Large aircraft means aircraft of more than 12,500 pounds, maximum certificated takeoff weight.

Lighter-than-air aircraft means aircraft that can rise and remain suspended by using contained gas weighing less than the air that is displaced by the gas.

Load factor means the ratio of a specified load to the total weight of the aircraft. The specified load is expressed in terms of any of the following: aerodynamic forces, inertia forces, or ground or water reactions.

[*Long-range communication system (LRCS)* means a system that uses satellite relay, data link, high frequency, or another approved communication system which extends beyond line of sight.]

[*Long-range navigation system (LRNS)* means an electronic navigation unit that is approved for use under instrument flight rules as a primary means of navigation, and has at least one source of navigational input, such as inertial navigation system, excludes preventive maintenance.

Major alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications—

(1) That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

(2) That is not done according to accepted practices or cannot be done by elementary operations.

Major repair means a repair—

(1) That, if improperly done, might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

(2) That is not done according to accepted practices or cannot be done by elementary operations.

Manifold pressure means absolute pressure as measured at the appropriate point in the induction system and usually expressed in inches of mercury.

Maximum speed for stability characteristics, V_{FC}/M_{FC} means a speed that may not be less than a speed midway between maximum operating limit speed (V_{MO}/M_{MO}) and demonstrated flight diving speed (V_{DF}/M_{DF}), except that, for altitudes where the Mach number is the limiting factor, M_{FC} need not exceed the Mach number at which effective speed warning occurs.

Medical certificate means acceptable evidence of physical fitness on a form prescribed by the Administrator.

Military operations area (MOA) means an airspace established outside Class A airspace to separate or segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.

Minimum descent altitude means the lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure, where no electronic glide slope is provided.

Night means the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.

Nonprecision approach procedure means a standard instrument approach procedure in which no electronic glide slope is provided.

Operate, with respect to aircraft, means use, cause to use or authorize to use aircraft, for the purpose (except as provided in § 91.13 of this chapter) of air navigation including the piloting of aircraft, with or without the right of legal control (as owner, lessee, or otherwise).

Operational control, with respect to a flight, means the exercise of authority over initiating, conducting, or terminating a flight.

Overseas air commerce means the carriage by aircraft of persons or property for compensation or hire, or the carriage of mail by aircraft, or the operation or navigation of aircraft in the conduct or furtherance of a business or vocation, in commerce between a place in any State of the United States, or the District of Columbia, and any place in a territory or possession of the United States; or between a place in a territory or possession of the United States, and a place in any other territory or possession of the United States.

Overseas air transportation means the carriage by aircraft of persons or property as a common carrier or compensation or hire, or the carriage of mail by aircraft, in commerce—

(1) Between a place in a State or the District of Columbia and a place in a possession of the United States; or

(2) Between a place in a possession of the United States and a place in another possession of the United States; whether that commerce moves wholly by aircraft or partly by aircraft and partly by other forms of transportation.

Over-the-top means above the layer of clouds or other obscuring phenomena forming the ceiling.

Parachute means a device used or intended to be used to retard the fall of a body or object through the air.

Person means an individual, firm, partnership, corporation, company, association, joint-stock association, as determined by the blade angle measured in a manner, and at a radius, specified by the instruction manual for the propeller.

Positive control means control of all air traffic, within designated airspace, by air traffic control.

Precision approach procedure means a standard instrument approach procedure in which an electronic glide slope is provided, such as ILS and PAR.

Preventive maintenance means simple or minor preservation operations and the replacement of small standard parts not involving complex assembly operations.

Prohibited area means an airspace designated under part 73 within which no person may operate an aircraft without the permission of the using agency.

Propeller means a device for propelling an aircraft that has blades on an engine-driven shaft and that, when rotated, produces by its action on the air, a thrust approximately perpendicular to its plane of rotation. It includes control components normally supplied by its manufacturer, but does not include main and auxiliary rotors or rotating airfoils of engines.

Public aircraft means an aircraft used only for the United States Government, or owned and operated (except for commercial purposes), or exclusively leased for at least 90 continuous days, by a government (except the United States Government), including a State, the District of Columbia, or a territory or possession of the United States, or political subdivision of that government; but does not include a government-owned aircraft transporting property for commercial purposes, or transporting passengers other than transporting (for other than commercial purposes) crewmembers or other persons aboard the aircraft whose presence is required to perform, or is associated with the performance of, a governmental function such as firefighting, search and rescue, law enforcement, aeronautical research, or biological or geological resource management; or transporting (for other than commercial purposes) persons aboard the aircraft if the aircraft is operated by the Armed Forces or an intelligence agency of the United States. An

behalf the operation is conducted certifies to the Administrator of the Federal Aviation Administration that the operation was necessary to respond to a significant and imminent threat to life or property (including natural resources) and that no service by a private operator was reasonably available to meet the threat.

Rated continuous OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under part 33 of this chapter, and limited in use to the time required to complete the flight after the failure of one engine of a multiengine rotorcraft.

Rated maximum continuous augmented thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically or in flight, in standard atmosphere at a specified altitude, with fluid injection or with the burning of fuel in a separate combustion chamber, within the engine operating limitations established under part 33 of this chapter, and approved for unrestricted periods of use.

Rated maximum continuous power, with respect to reciprocating, turbopropeller, and turboshaft engines, means the approved brake horsepower that is developed statically or in flight, in standard atmosphere at a specified altitude, within the engine operating limitations established under part 33, and approved for unrestricted periods of use.

Rated maximum continuous thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically or in flight, in standard atmosphere at a specified altitude, without fluid injection and without the burning of fuel in a separate combustion chamber, within the engine operating limitations established under part 33 of this chapter, and approved for unrestricted periods of use.

Rated takeoff augmented thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically under standard sea level conditions, with fluid injection or with the burning of fuel in a separate combustion chamber, within the engine operating limitations established under part 33, and limited in use to periods of not over 5 minutes for takeoff operation.

Rated takeoff thrust, with respect to turbojet engine type certification, means the approved jet thrust that is developed statically under standard sea level conditions, without fluid injection and without the burning of fuel in a separate combustion chamber, within the engine operating limitations established under part 33 of this chapter, and limited in use to periods of not over 5 minutes for takeoff operation.

Rated 30-minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under part 33 of this chapter, and limited in use to a period of not more than 30 minutes after the failure of one engine of a multiengine rotorcraft.

Rated 2 ½-minute OEI power, with respect to rotorcraft turbine engines, means the approved brake horsepower developed under static conditions at specified altitudes and temperatures within the operating limitations established for the engine under part 33 of this chapter, and limited in use to a period of not more than 2½ minutes after the failure of one engine of a multiengine rotorcraft.

Rating means a statement that, as a part of a certificate, sets forth special conditions, privileges, or limitations.

Reporting point means a geographical location in relation to which the position of an aircraft is reported.

Restricted area means an airspace designated under part 73 within which the flight of aircraft, while not wholly prohibited, is subject to restriction.

RNAV way point (W/P) means a predetermined geographical position used for route or instrument approach definition or progress reporting purposes that is defined relative to a VORTAC station position.

Rocket means an aircraft propelled by ejected expanding gases generated in the engine from self-contained propellants and not dependent on the intake of outside substances. It includes any part which becomes separated during the operation.

(1) *Class A rotorcraft-load combination* means one in which the external load cannot move freely, cannot be jettisoned, and does not extend below the landing gear.

(2) *Class B rotorcraft-load combination* means one in which the external load is jettisonable and is lifted free of land or water during the rotorcraft operation.

(3) *Class C rotorcraft-load combination* means one in which the external load is jettisonable and remains in contact with land or water during the rotorcraft operation.

(4) *Class D rotorcraft-load combination* means one in which the external-load is other than a Class A, B, or C and has been specifically approved by the Administrator for that operation.

Route segment means a part of a route. Each end of that part is identified by—

(1) a continental or insular geographical location; or

(2) a point at which a definite radio fix can be established.

Sea level engine means a reciprocating aircraft engine having a rated takeoff power that is producible only at sea level.

Second in command means a pilot who is designated to be second in command of an aircraft during flight time.

Show, unless the context otherwise requires, means to show to the satisfaction of the Administrator.

Small aircraft means aircraft of 12,500 pounds or less, maximum certificated takeoff weight.

Special VFR conditions mean meteorological conditions that are less than those required for basic VFR flight in controlled airspace and in which some aircraft are permitted flight under visual flight rules.

Special VFR operations means aircraft operating in accordance with clearances within controlled airspace in meteorological conditions less than the basic VFR weather minima. Such operations must be requested by the pilot and approved by ATC.

Standard atmosphere means the atmosphere defined in U.S. Standard Atmosphere, 1962 (Geopotential altitude tables).

(1) With respect to reciprocating engines, means the brake horsepower that is developed under standard sea level conditions, and under the maximum conditions of crankshaft rotational speed and engine manifold pressure approved for the normal takeoff, and limited in continuous use to the period of time shown in the approved engine specification; and

(2) With respect to turbine engines, means the brake horsepower that is developed under static conditions at a specified altitude and atmospheric temperature, and under the maximum conditions of rotorshaft rotational speed and gas temperature approved for the normal take off, and limited in continuous use to the period of time shown in the approved engine specification.

Takeoff safety speed means a referenced airspeed obtained after lift-off at which the required one-engine-inoperative climb performance can be achieved.

Takeoff thrust, with respect to turbine engines, means the jet thrust that is developed under static conditions at a specific altitude and atmospheric temperature under the maximum conditions of rotorshaft rotational speed and gas temperature approved for the normal takeoff, and limited in continuous use to the period of time shown in the approved engine specification.

Tandem wing configuration means a configuration having two wings of similar span, mounted in tandem.

TCAS I means a TCAS that utilizes interrogations of, and replies from, airborne radar beacon transponders and provides traffic advisories to the pilot.

TCAS II means a TCAS that utilizes interrogations of, and replies from airborne radar beacon transponders and provides traffic advisories and resolution advisories in the vertical plane.

TCAS III means a TCAS that utilizes interrogation of, and replies from, airborne radar beacon transponders and provides traffic advisories and resolution advisories in the vertical and horizontal planes to the pilot.

Time in service, with respect to maintenance time records, means the time from the moment an air-

(1) As used with respect to the certification, ratings, privileges, and limitations of airmen, means a specific make and basic model of aircraft, including modifications thereto that do not change its handling or flight characteristics. Examples include: DC–7, 1049, and F–27; and

(2) As used with respect to the certification of aircraft, means those aircraft which are similar in design. Examples include: DC–7 and DC–7C; 1049G and 1049H; and F–27 and F–27F.

(3) As used with respect to the certification of aircraft engines means those engines which are similar in design. For example, JT8D and JT8D–7 are engines of the same type, and JT9D–3A and JT9D–7 are engines of the same type.

United States, in a geographical sense, means (1) the States, the District of Columbia, Puerto Rico, and the possessions, including the territorial waters, and (2) the airspace of those areas.

United States air carrier means a citizen of the United States who undertakes directly by lease, or other arrangement, to engage in air transportation.

VFR over-the-top, with respect to the operation of aircraft, means the operation of an aircraft over-the-top under VFR when it is not being operated on an IFR flight plan.

Warning area means an airspace of defined dimensions, extending from 3 nautical miles outward from the coast of the United States, that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

Winglet or tip fin means an out-of-plane surface extending from a lifting surface. The surface may or may not have control surfaces.

(Amdt. 1–9, Eff. 9/26/65); (Amdt. 1–10, Eff. 3/29/66); (Amdt. 1–12, Eff. 8/7/67); (Amdt. 1–13, Eff. 8/3/67); (Amdt. 1–14, Eff. 11/18/67); (Amdt. 1–16, Eff. 5/8/70); (Amdt. 1–17, Eff. 6/25/70); (Amdt. 1–19, Eff. 9/18/70); (Amdt. 1–20, Eff. 2/4/71); (Amdt. 1–21, Eff. 7/20/71); (Amdt. 1–22, Eff.4/14/72); (Amdt. 1–23, Eff. 10/31/74); (Amdt. 1–24, Eff. 3/15/75); (Amdt. 1–25, Eff. 12/9/76);

§ 1.2 Abbreviations and symbols.

In Subchapters A through K of this chapter—

AGL means above ground level.

ALS means approach light system.

ASR means airport surveillance radar.

ATC means air traffic control.

CAS means calibrated airspeed.

CAT II means Category II.

CONSOL or *CONSOLAN* means a kind of low or medium frequency long range navigational aid.

DH means decision height.

DME means distance measuring equipment compatible with TACAN.

EAS means equivalent airspeed.

FAA means Federal Aviation Administration.

FM means fan marker.

GS means glide slope.

HIRL means high-intensity runway light system.

IAS means indicated airspeed.

ICAO means International Civil Aviation Organization.

IFR means instrument flight rules.

ILS means instrument landing system.

IM means ILS inner marker.

INT means intersection.

LDA means localizer-type directional aid.

LFR means low-frequency radio range.

LMM means compass locator at middle marker.

LOC means ILS localizer.

LOM means compass locator at outer marker.

M means mach number.

MAA means maximum authorized IFR altitude.

MALS means medium intensity approach light system.

MALSR means medium intensity approach light system with runway alignment indicator lights.

MCA means minimum crossing altitude.

MDA means minimum descent altitude.

MEA means minimum en route IFR altitude.

MM means ILS middle marker.

MOCA means minimum obstruction clearance altitude.

RAIL means runway alignment indicator light system.

RBN means radio beacon.

RCLM means runway centerline marking.

RCLS means runway centerline light system.

REIL means runway end identification lights.

RR means low or medium frequency radio range station.

RVR means runway visual range as measured in the touchdown zone area.

SALS means short approach light system.

SSALS means simplified short approach light system.

SSALSR means simplified short approach light system with runway alignment indicator lights.

TACAN means ultra-high frequency tactical air navigational aid.

TAS means true airspeed.

TCAS means a traffic alert and collision avoidance system.

TDZL means touchdown zone lights.

TVOR means very high frequency terminal omnirange station.

V_A means design maneuvering speed.

V_B means design speed for maximum gust intensity.

V_C means design cruising speed.

V_D means design diving speed.

V_{DF}/M_{DF} means demonstrated flight diving speed.

V_F means design flap speed.

V_{FC}/M_{FC} means maximum speed for stability characteristics.

V_{FE} means maximum flap extended speed.

V_H means maximum speed in level flight with maximum continuous power.

V_{LE} means maximum landing gear extended speed.

V_{LO} means maximum landing gear operating speed.

V_{LOF} means lift-off speed.

V_{MC} means minimum control speed with the critical engine inoperative.

V_{SO} means the stalling speed or the minimum steady flight speed in the landing configuration.

V_{SI} means the stalling speed or the minimum steady flight speed obtained in a specific configuration.

V_{TOSS} means takeoff safety speed for Category A rotorcraft.

V_X means speed for best angle of climb.

V_Y means speed for best rate of climb.

V_1 means takeoff decision speed (formerly denoted as critical engine failure speed).

V_2 means takeoff safety speed.

V_2 min means minimum takeoff safety speed.

VFR means visual flight rules.

VHF means very high frequency.

VOR means very high frequency omnirange station.

VORTAC means collocated VOR and TACAN.

(Amdt. 1–10, Eff. 3/29/66); (Amdt. 1–14, Eff. 11/18/67); (Amdt. 1–15, Eff. 2/25/68); (Amdt. 1–18, Eff. 8/18/70); (Amdt. 1–27, Eff. 9/14/77); (Amdt. 1–28, Eff. 9/21/77); (Amdt. 1–29, Eff. 3/1/78); (Amdt. 1–32, Eff. 12/6/84); (Amdt. 1–34, Eff. 10/3/88); (Amdt. 1–35, Eff. 2/9/89)

§ 1.3 Rules of construction.

(a) In Subchapters A through K of this chapter, unless the context requires otherwise—

(1) Words importing the singular include the plural;

(2) Words importing the plural include the singular; and

(3) Words importing the masculine gender include the feminine.

(b) In Subchapters A through K of this chapter, the word—

(1) *Shall* is used in an imperative sense;

(2) *May* is used in a permissive sense to state authority or permission to do the act prescribed, and the words "no person may . . ." or "a person may not . . ." mean that no person is required, authorized, or permitted to do the act prescribed; and